

Systems Thinking, Decision Making: What Is Known and What Needs to Be Learned

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Abstract

The understanding and use of systems has been studied in numerous environments, particularly among leadership and management. However, as yet it is unclear what people at large know about systems thinking, where they gained their knowledge, or how important the role they perceive it to have in their decision making processes. Through a mixed model survey and follow-on interviews, this first phase of a two-year exploratory study considered these questions. Results indicated that, although the 172 respondents agreed systems thinking is important to 79.7% of decisions made, and approximately half believed they understood the meaning of systems and application of systems thinking, most demonstrated no or limited understanding of either. Finally, most participants' latently gleaned impressions of systems and systems thinking were gained through informal experiences since completing their secondary school education.

Introduction

With Checkland's (1981) description of *applied systems thinking*, he differentiated between *hard systems thinking* and *soft systems thinking*. This has led more recently to attempts to create a holistic standard for the understanding and application of systems thinking (Jackson, 2006; Dongping, 2010). Some attempting to accomplish this have focused on developing *learning organizations* that by design nurture feedback loops and, as a result, encourage organizational growth and health (Andreadis, 2009; Senge, 2010) or on action learning (Seddon

& Caulkin, 2007). Those focusing on educational systems have used it to more effectively plan the interactions between parts of educational systems (Price-Mitchell, 2009) or have used it to improve student outcomes (Thornton, Peltier, & Perrault, 2004; Yoon, 2008). Some have used the feedback process as a basis for the creation of models to both understand and predict actions occurring as a result of those feedback loops (Capelo & Dias, 2009; Hung, 2008). However, even though there has been an emphasis on systems thinking and learning in government, business, educational, and medical environments, little if any research exists on the use of systems thinking by individuals not in management or leadership within these specific groups.

Conceptual Framework

Since all systems thinking works based on balancing and feedback loops (Baker, 2006), the interaction of these loops can cause delays that create missteps because of missing information or miscalculations (Morçöl, 2005). Systems thinking is a higher order process that, in today's complex world, can be required of average people without warning. Because individuals' roles within systems can shift unpredictably and because systems overlap, this means that people at large would benefit from knowledge of systems thinking and systems structures. In addition, since numerous systems theorists have suggested systems can be structured or improved based on strategic planning, people's knowledge of systems to accomplish maximal beneficial control becomes important.

Method

Using a mixed model questionnaire composed of 32 closed-ended questions and six open-ended questions, this study examined people's estimations of their understanding of social systems and their understanding of and use of systems thinking. The questionnaire's closed-ended questions probed people's self-ratings, while its open-ended questions probed definitions

of systems, systems in which they function, and the role of systems thinking in their lives.

Interviews, 15 in all, probed questionnaire responses in greater detail. A total of 172 individuals drawn from a population of 312 with varying educational, economic, and social background completed the anonymous online survey (N=310, n=172, CI 95%). Quantitative data were analyzed for descriptive statistics and correlations, while qualitative data were analyzed for patterns and themes. Finally, all data were correlated to determine what overall insights could be identified.

Findings

This high-level summary includes a discussion of a number of findings about overall attitudes toward the use of systems thinking, overall understanding of systems thinking and systems, and where learning about the nature of systems occurred.

Understanding of Social Systems

The 172 respondents indicated a mean understanding of social systems of 3.14, and a median and a mode of 3. A breakdown of percentages of respondents indicating each level of understanding is provided in Table 1.

The following criteria based on autopoiesis (Bausch, 2001) were used to identify how complete the definitions people provided were. Those criteria included: (a) provided clear indication of the importance of people rather than simply processes to indicate they understood social systems, (b) provided clear indication of the interrelatedness of members of the system, and (c) provided clear indication of the unique change in nature of a system and its components when considered as a whole in contrast to the nature of each of its components when they are considered separately. Responses for individuals who stated they had complete understanding included a range of understanding. At one end was, “a series of events related to each other in

order to work harmoniously” (Respondent 1), and on the other, “Interaction involving interrelated components, and people, with an agreed on system of customs, beliefs and, goals” (Respondent 159). Interestingly, one respondent (Respondent 147) indicated a focus on open or closed systems, but related comments only to an experimental design, discussing independent and dependent variables. Most responses indicated understanding of two of the three criteria, but none indicated total understanding.

At the other end of the spectrum, individuals who indicated having no knowledge of social systems spoke mainly about systems focused on accomplishing a goal—a systematic method of working—rather than a social system itself. A few of them did relate social systems to individuals or indicated the interrelated nature of members of systems, and all participants provided at least one of the three criteria for demonstrating understanding of social systems in their definition. It appeared that, for these respondents, the important characteristic of a system was the interdependence of its parts, while for respondents indicating they had some knowledge of systems the encompassing nature of systems was important, while recognition of the interdependence of the parts was rarely shared. Further, the only respondent providing a complete definition of social systems based on the criteria used was an individual indicating no knowledge of social systems.

Of all respondents, 92.4% (one of whom indicated complete understanding of social systems) provided accurate examples of social systems. Further, 66.8% of respondents provided appropriate examples of systems in which they make decisions. Although during interviews, 12 of 15 respondents indicated they had never considered systems as relating to people until asked for a definition of social systems in the questionnaire, all indicated that as soon as the question was posed they began conceptualizing systems as involving individuals and individual

interactions. Finally, respondents described both large and small systems, including a single individual.

Use of Systems Thinking

As Table 1 illustrates, the use of systems thinking is the opposite what might be expected. There was no significant correlation between respondents' self-ratings of understanding of social systems and use of systems thinking. Most who indicated complete understanding of social systems indicated only occasional practice of systems thinking, while those who had no understanding indicated practicing it at least half of the time. The few respondents who indicated they always used systems thinking in decision making, when indicating in which circumstances they used it, they made conditionalized when and how they used it.

Table 1

Indicated Understanding of Social Systems & Use of Systems Thinking

Indicated Understanding of Social Systems	Percentage of Respondents Indicating Use	Indicated Mean Systems Thinking Use
5 (Understand Completely)	7%	4.5
4 (Understand Much)	18.6%	3.8
3 (Understand Enough)	36.6%	3.6
2 (Understand Little)	26.2%	3.3
1 (No understanding)	10.5%	2.9

Respondents' definitions of systems thinking were judged on two criteria: (a) mention of each decision impacting other parts of the system, and (b) indication that each decision's impact extended to impacting the nature of the system itself. Definitions of systems thinking provided indicated that all participants had minimal understanding of systems thinking. The most complete responses stated, "I define system thinking as a decision making process that revolves around the collaborative unit, not necessarily integrating all the systems of self" (Respondent 126). Another stated that systems thinking was a dynamic process with an emotional

component. However, the responses of the majority of the respondents who indicated they had complete understanding of social systems demonstrated minimal understanding at best, and those probed during interviews appeared displeased with the incomplete definitions of social systems they had provided in the questionnaires.

Although 74.4% of participants indicated they had at least partial knowledge of systems thinking, 66.9% demonstrated either a miscomprehension of it or no conceptualization of it. The clearest and most complete definitions of systems thinking were provided by those who had ranked themselves as having some, although incomplete, understanding of systems thinking. The range of responses included a number of individuals focused on the idea of thinking about systems rather than systems thinking as a process, a number of others focused on it as a routine, and a number who focused on the idea of it as a brainstorming exercise. In contrast, a couple of strong responses follow:

I would guess it to be thinking in a way that connects the different parts. For example, deciding to go to a ball game would connect with how much gas is in the car, how much money you have, how much time you have, who is going with you, etc. Those interconnecting parts relate to one another regarding the same decision. (Respondent 52)

“I would define systems thinking as the component parts of a system that can best be understood in the context of relationships with each other and with other systems, rather than in isolation” (Respondent 59). Although these definitions were more complete, it is interesting that they focused on practical application to small, well-defined situations rather than on a clear, more abstract definition.

Two other interesting responses were the following. “To be positive” (Respondent 69) illustrates four respondents’ comments that may have indicated either a lack of understanding of the nature of systems thinking or a personal perspective that impacts the conceptualization of systems thinking. And, perhaps most interesting, was this definition shared by Respondent 2. “I

think of 'systems thinking' as not assigning blame to an individual but to think of the individual's action within the system he or she operates." This definition might provide either a potential example of people's interpretation of systems thinking based on personal experience or a misprocessing of information gained from observation of the experiences of other.

Further, open-ended responses to a probe on the nature of the decisions for which systems thinking was used raised additional questions about whether the 66.8% of respondents who provided examples to illustrate their use of it had, in fact, used it. The following response is just such an example: "making of a large purchase (automobile, house, etc.) selection of job ordering of personal priorities dealing with difficult people where to go on vacation making a choice in an election" (Respondent 7). Although systems were sometimes mentioned, exactly how the analysis and decision making process itself took place was unclear. Further probing of this is currently underway.

To Use Systems Thinking or Not to Use It

Respondents, in a closed-ended, multiple-option question with an additional write-in response opportunity, selected reasons they did not use systems thinking. Those reasons clustered into several groups: (a) never learned systems and systems thinking, (b) prefer making decisions based on gut or intuitive responses, (c) believe systems thinking is too complex, and 4) believe it is sometimes or always unnecessary. While all respondents, even those indicating they use it all the time, indicated at least one reason why they did not use systems thinking, approximately half of respondents indicated several reasons. A full 44.8% of respondents indicated never having learned about systems thinking, 27.9% indicated they made decisions based on gut or intuitive reactions, 17.4% indicated systems thinking was too complex to use, and 14.5% indicated systems thinking was unnecessary. No significant correlation existed,

though, between knowledge about social systems or use of systems thinking and any of these four response groupings or any of the 11 specific reasons provided.

Discussion

This study provides a number of insights relevant to the planning of instruction on social systems and system thinking. First, it became clear that few people at large understand completely the concept or application of social systems. In addition, definitions of systems thinking indicated that, in part, people believed the term referred to the act of thinking about systems rather than to a decision making, problem solving, or information processing model used to analyze action plans or situations within a systemic framework. Upon reflection, it is possible some participants may not have provided complete definitions for the terms social system and systems thinking even though they understood them completely because they may not have understood the level of detail they were being asked to provide. However, follow-on interviews where respondents indicated they had not previously considered systems as being related to people do not support that possibility. In fact, one respondent during an interview called the moment she read the question on social systems like having a “light bulb turned on” (Respondent 131). After that, she indicated, she began contemplating the meaning and application of the concept of social systems. It appears equally or more possible that any explicit instruction that had occurred on social systems may have been related to a specific social system and that the information did not generalize for respondents into knowledge that might not be easily manipulated for application to other situations or systems.

It proved interesting that only two respondents indicated they always used systems thinking, particularly since all 172 respondents provided reasons for choosing not to use it at times. This might be explained in part by decision making theory—simpler decisions require

less complicated decision making processes. In addition, most respondents indicated they did not use systems thinking because it was either too complex or was a decision making method they had never learned to use. Most indicated that instead of systems thinking they chose to use gut responses to situations. Additionally, no statistically significant correlations occurred between either knowledge of social systems or systems thinking and any of the presented reasons for not using systems thinking in decision making. Finally, this could have indicated respondents either previously had not considered the value of systems thinking in decision making or, perhaps, had not thought logically through the decisions they made. Further probing of these possibilities and others is currently underway.

All of this is important to consider when determining how to develop instructional projects regarding social systems and systems thinking. It appears that as many as 25.6% of the respondents had received some direct or indirect training about systems. However, any training received appears to have focused on specific settings (systems) and, perhaps as a result, respondents' understanding proved incomplete and often inaccurate. In addition, respondents' inability to apply that knowledge to the generalized questions in this study indicated they had limited knowledge of systems and that knowledge in fact proved often to be incomplete or inaccurate. As a result, they appeared unable to apply such instruction to other systems or to systems in general. Finally, some respondents may have guessed well on responses, although questions were arranged to provide no hints to the meanings being probed and so that individuals could not garner the nature of systems from information provided through the survey. These possibilities are all being considered in greater during the second-phase study currently being analyzed.

Conclusions

The ultimate goal of this research is to develop instruction to counteract people's misconceptions about, barriers to understanding, and lack of knowledge about systems thinking and how to use it in various situations. As a result, this exploratory study provided important first insights toward that end. This study indicated that the definitions of these concepts and their applications are as yet unclear to many people. With the dynamically changing nature of systems, however, it seems important to develop active instruction programs from which individuals can learn how to apply this knowledge well and flexibly to any situations in which they find themselves with the need.

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